

# PATENT COOPERATION TREATY

# PCT



# INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 39671	FOR FURTHER ACTION See Form PCT/IPEA/416							
International application No.	International filing date (	lay/month/year)	Priority date (day	y/month/year)				
PCT/FI 2003/000627 27.08.200			28.08.20	02				
International Patent Classification (IPC) or national classification and IPC EPO - DG 1								
D21F1/00, D21F7/00	D21F1/00, D21F7/00							
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Applicant								
Metso Paper Inc. et a	1		(52)	· · · · · · · · · · · · · · · · · · ·				
<ol> <li>This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</li> </ol>								
2. This REPORT consists of a total	of 3 sheets,	including this cover	sheet.					
3. This report is also accompanied b	y ANNEXES, comprising:							
a. (sent to the applicant and to the International Bureau) a total of 5 sheets, as follows:								
				d are the basis of this report				
	containing rectifications at re Instructions).	thorized by this Aut	hority (see Rule 7	0.16 and Section 607 of the				
		at which this Authori	ty considers conta	in an amendment that goes				
beyond the di Supplementa		l application as filed	, as indicated in it	em 4 of Box No. I and the				
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b (sent to the Internation	onal Bureau only) a total of			• • • • • • • • • • • • • • • • • • • •				
, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the								
Administrative Instru	ctions).							
4. This report contains indications re		as:						
Box No. I Basis o	f the report							
Box No. II Priority	,							
Box No. III Non-es	tablishment of opinion with	regard to novelty, in	eventive step and	industrial applicability				
Box No. IV Lack of	Box No. IV Lack of unity of invention							
	applicability; citations and explanations supporting such statement  Box No. VI Certain documents cited							
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Box No. VIII Certain observations on the international application								
Date of submission of the demand	1	Date of completion of this report						
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27.02.2004	02.11.2004							
Name and mailing address of the IPEA/S	Authorized officer							
Patent- och registreringsverket Box 5055								
8-102 42 STOCKHOLM	Nils Nordin/EK							
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Form PCT/IPEA/409 (cover sheet) (January 2004)

# INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/FI 2003/000627

Box	No. I	Basis	s of the report					
١.	With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.							
	This report is based on a translation from the original language into the following language which is the language of a translation furnished for the purposes of:							
		ir ir	nternational search (under Rules 12.3 and 23.1(b))					
	publication of the international application (under Rule 12.4)							
		ir	nternational preliminary examination (under Rules 55.2 and/or 55.3)					
2.	With regard to the elements of the international application, this report is based on (replacement sheets which have be furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally file and are not annexed to this report):							
		the intern	national application as originally filed/furnished					
	$\boxtimes$	the descri	iption:					
	_	pages _	as originally filed/furnished					
		pages* _						
		pages* _	received by this Authority on					
	$\boxtimes$	the claim	ıs:					
		pages _	as originally filed/firmished					
		pages*_	as amended (together with any statement) under Article 19					
		pages*	4-5 received by this Authority on 02.07.2004 received by this Authority on					
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		pages*	received by this Authority on					
		_	ce listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.					
3.		The ame	andments have resulted in the cancellation of:					
			the description, pages					
			the claims, Nos.					
		$\sqcap$	the drawings, sheets/figs					
		$\overline{\Box}$	the sequence listing (specify):					
			any table(s) related to the sequence listing (specify):					
4.	П	This report made, sin 70.2(c)).	ort has been established as if (some of) the amendments annexed to this report and listed below had not been nee they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule					
			the description, pages					
		$\Box$	the claims, Nos.					
		Ħ	the drawings, sheets/figs					
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		$\exists$	the sequence listing (specify):					
		L_J	any table(s) related to the sequence listing (specify):					
*	If item	a 4 applies,	, some or all of those sheets may be marked "superseded."					

Form PCT/IPEA/409 (Box No. I) (January 2004)

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/FI 2003/000627

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

#### 1. Statement

Novelty (N)	Claims Claims	1-9	YES NO
Inventive step (IS)	Claims Claims	1-9	YES NO
Industrial applicability (IA)	Claims Claims	1-9	YES NO

#### 2. Citations and explanations (Rule 70.7)

The following document is cited in the International Search Report:

#### D1: WO 9955958 A1

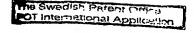
The cited document represents the general state of the art. The invention defined in claims 1-9 is not disclosed by any of these documents.

The cited prior art does not give any indication that would lead a person skilled in the art to the claimed method for controlling the temperature of a web.

Therefore, the claimed invention is not obvious to a person skilled in the art.

Accordingly, the invention defined in claims 1-9 is novel and is considered to involve an inventive step. The invention is industrially applicable.

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### Method for controlling the temperature of a cellulosic web entering a dryer

The present invention relates to a method for controlling the temperature of a web, which is formed from cellulosic pulp and is to be passed to a dryer, by way of applying temperature-controlled liquid to the web when passed into a closed space, wherein said temperature-controlled liquid is applied at controlled pressure and flow rate to the web.

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Conventionally, a traveling cellulosic web has been heated by flooding the web with a liquid, whereby uncontrollable penetration of the liquid into the web occurs. As this overflow-flooding step of heating takes place in an open space, it is hampered by problems from the overflow of the liquid and release of expansion steams.

It is an object of the present invention to overcome the above-mentioned problems by virtue of a method characterized in that said closed space is defined by two wires and side deckles, and that said liquid is applied through the wires into the web both from below the bottom wire and from above the top wire.

Generally, the closed spaced remaining between the wires is maintained at a moderate positive pressure. The method according to the invention is capable of controllably setting the web temperature at a desired level, e.g., close to 100 °C, thus improving water removal from the web in the press section next downstream of the closed space, whereby the web is maximally hot and has a high solids content at the instant the web enters the dryer section. Furthermore, the method according to the invention may be applied generally in the temperature control of a web, even for cooling, thus making it possible to set the web temperature optimally for drying a cellulosic web. The method also facilitates addition of chemicals into the web in order to improve the qualities of the web.

According to the invention, the liquid can be applied via boxes to the web, both from the underside of the lower wire and from the top side of the upper wire either simultaneously or alternatingly. The penetration of the liquid being applied into the web

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may be improved if so desired by way of maintaining a pressure difference between the liquid application point and the side of the web opposite to the application point. This arrangement can be accomplished using, e.g., suction boxes that are located on the opposite side of the web relative to the liquid application point, substantially aligned with said point.

There may be located a plurality of liquid feed points above and below the web, preferably in alternating positions.

As the web enters the closed space between the wires, its solids content is in a range of about 0.5 % to about 4.0 %, while the solids content is in a range of about 20 % to about 30 % when the web exits the closed space and enters the press section.

In the following, the invention will be described in greater detail by making reference to the appended drawing showing a schematic side elevation view of an apparatus layout suitable for implementing the method according to the invention.

The method employs a twin-wire machine having a bottom wire 1 and top wire 2. Cellulosic pulp is fed into the headbox 3 of the twin-wire machine, wherefrom the pulp flows as a uniform sheet into a closed space 4 defined by the bottom wire 1 and the top wire 2 in cooperation with side deckles (not shown), wherein a web 5 is formed. When entering this closed space 4, the solids content of the web is typically in a range of about 0.5 % to about 4.0 %. This closed space 4 is generally maintained at a moderate positive pressure.

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In order to control the temperature of the web 5 to a desired level, below the bottom wire 1 and/or above the top wire 2 are placed liquid feed points 6, 7, 10 wherefrom to the web 5 is applied a liquid advantageously via a box at a controlled temperature, pressure and flow rate. As shown in the drawing, the liquid is applied to the web 5 first from below the bottom wire 1 at liquid feed points 6 and 10, whereupon liquid application takes place from above the top wire 2 at liquid feed points 7. Obviously, the apparatus may incorporate more liquid feed points either above or below the web

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or in alternating positions both above and below the web.

When necessary, the penetration of the liquid being applied into the web 5 can be improved by means of suction boxes 8, 9 adapted to operate opposite to some or each one of the liquid feed points 6, 7, 10, substantially aligned with the opposed liquid feed point.

According to an embodiment of the invention, the web is heated in the method of the invention to a temperature close to 100°, whereby the removal of water from the web 5 is enhanced in the press section located downstream of the twin-wire region. Resultingly, the temperature and solids content of the web are elevated maximally high as the web enters the dryer section, whereby drying of the web is speeded up and energy consumption of the dryer is lowered.

Alternatively, the method may also be employed for cooling the web 5 in order to set the temperature of the web 5 to an optimal level for drying a cellulosic web.

Furthermore, the method according to the invention facilitates the addition of web quality improving chemicals into the web in conjunction with the liquid being applied to the web, thus allowing the control of, e.g., the pH of the web.

When exiting the closed space 4 defined by the wires 1, 2, the solids content of the web has increased reaching from about 20 % to about 30 %.



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Claims:

1. A method for controlling the temperature of a web (5), which is formed from cellulosic pulp and is to be passed to a dryer, by way of applying temperature-controlled liquid to the web when passed into a closed space (4), wherein said temperature-controlled liquid (6, 7, 10) is applied at controlled pressure and flow rate to the web (5), characterized in that said closed space (4) is defined by two wires (1, 2) and side deckles, and that said liquid is applied through the wires (1, 2) into the web both from below the bottom wire (1) and from above the top wire (2).

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2. Method according to claim 1, characterized in that in the closed space (4) between the wires (1, 2) a moderate positive pressure is maintained.

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3. Method according to claim 2, characterized in that the penetration of the liquid being applied into the web (5) is improved by maintaining a pressure difference between the opposite sides of the web.

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4. Method according to any of the previous claims, characterized in that the temperature of the web (5) is elevated substantially close to 100 °C.

5. Method according to claim 3 or 4, characterized in that, in order to establish said pressure difference, a suction box (8, 9) is adapted to operate opposite to some or to each liquid feed point (6, 7, 10) on the other side of the web, substantially aligned with said liquid feed point (6, 7, 10).

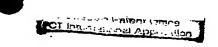
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6. Method according to any of the preceding claims, characterized in that chemicals are added to the web (5) in conjunction with the liquid application in order to improve the qualities of the web.

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7. Method according to claim 6, characterized in that the liquid is applied to the web at several successive points (6, 10, 7).

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- 8. Method according to claim 7, characterized in that the liquid is applied alternatingly from above and from below the web.
- 9. Method according to any of the preceding claims, characterized in that the solids
  5 content of the ingoing web (5) is about 0.5 4.0 % and the solids of the outgoing web
  prior to its entry into the dryer is about 20 30 %.